Additional Fees:

Enclosed herewith kindly find a check for $60 for a one month extension of time, no additional fees are believed to be required. However, should it be determined that any additional fees are due, please contact the undersigned attorney for immediate remittance of any such fees.

REMARKS

In the last Office Action, the examiner noted that the technology center 3700 ordered a Withdrawal of Notice of Allowance for this application. Claims 17-23 and 25-36 were rejected as being unpatentable over Applicants Admitted Prior Art (AAPA) in view of US Patent 4,554,130, issued to Ecer.

By this response, the claims have been amended to further distinguish the claimed invention over the AAPA and Ecer.

The present invention pertains to a method of forming a metal product, such a tool bit, snow ski blade or kitchen knife, having an edge area comprising a cutting edge (see, specification at page 58, lines 2-9). The cutting edge is formed, in accordance with the present invention, having a wear resistant surface with superior sharpening and sharpened edge holding characteristics. In accordance with the present invention, a work piece substrate is provided having an edge area comprising a cutting edge portion. A high-density coating process is used to coat the cutting edge portion of the work piece substrate with a wear resistant coating material. A hot isostatic pressing treatment is performed on the coated work piece substrate to obtain a metal product having a wear resistant surface comprised of the coating material. The hot isostatic pressing treatment comprising disposing the coated workpiece substrate within a chamber, filling the chamber with an inert gas, and heating and pressurizing the inert gas so that thewear resistant surface is formed at the cutting edge portion having diffusion bonding between the coating material and the work piece substrate. The diffusion bond overcomes the drawbacks of prior cutting tools by providing a wear resistant and edge holding cutting

edge that becomes an integral part of the cutting tool substrate. The cutting edge portion is sharpened so that the diffusion bonding between the coating material and the workpiece substrate retains the wear resistant coating material on the cutting edge portion. In accordance with the present invention, the drawbacks of the prior art are overcome because the wear resistant coating is diffusion bonded and thus retained during the sharpening process of the cutting edge portion and during use of the cutting edge portion of the formed metal product (see, specification page 57, line 12 through page 60, line 3 and Figures 2(a) through 2(d)).

As shown in Figures 2(a) through 2(d), the inventive method can be used for forming, a cutting tool having a wear resistant surface. The inventive method can be employed to produce, for example, a long lasting cutting tool from a relatively inexpensive cutting tool substrate 10. For example, the tool substrate 10 may be a drill bit, end mill, lathe tool bit, saw blade, planer knifes, cutting tool inserts, or other cutting tool part. The substrate may, alternatively, be something other than a tool. For example, ice skate blades and snow ski edges may be treated in accordance with the present invention to obtain a long wearing edge. Kitchen knives may be treated in accordance with the present invention to reduce the need for constant sharpening. Further, products such as pen tips and fishing hooks may be treated in accordance with the present invention so as to benefit from long lasting durability (see, for example, pages 57 – 60 of the present specification).

Claims 17-23 and 25-36 were rejected as being unpatentable over Applicant's Admitted Prior Art ("AAPA") in view of US Patent 4,554,130, issued to Ecer ("Ecer").

The claims have been rejected as being obvious based on the combination of AAPA and Ecer. In relevant part, AAPA discusses references that show that a hot isostatic pressing treatment can be used in repairing gas turbine engine airfoil parts to form a diffusion boundary between a coating and a substrate. The AAPA also discusses in relevant part the conventional methods and structures of cutting tools which have either wear resistant materials applied by mechanically bonded coatings or brazed cutting tips. The AAPA

specifically note the drawbacks of the conventional cutting tools which fail due to wear resistant materials being removed during use of the cutting tool. Specifically, the AAPA points out that the mechanically bonded coatings flake or chip due to failure at the mechanical bond interface between the coating and the cutting tool substrate, or the brazed cutting tips break off during use due to the relatively brittle brazed interface between the cutting tool substrate and the cutting tip.

Ecer teaches a method of consolidating metallic body means. The method comprises (a) applying to the body means a mixture of: (i) metallic powder (ii) fugitive organic binder (iii) volatile solvent (b) drying the mixture, and (c) burning out the binder and solvent at elevated temperature, (d) and applying pressure to the powdered metal to consolidate same on said body means.

In relevant part, Ecer only teaches that the substrate can be a tool, such as a drilling bit core on which cladding is consolidated. However, the method taught by Ecer requires the inclusion of an organic binder and a volatile solvent. The binder and solvent are burned out at elevated temperature. Then, the consolidation of the cladding may take place in a bed of grain (as for example ceramic particulate) adjacent the mixture.

In direct contrast to Ecer, in accordance with the present invention, a work piece substrate is provided having an edge area comprising a cutting edge portion. A high-density coating process is used to coat the cutting edge portion of the work piece substrate with a wear resistant coating material. A hot isostatic pressing treatment is performed on the coated work piece substrate to obtain a metal product having a wear resistant surface comprised of the coating material. The hot isostatic pressing treatment comprising disposing the coated workpiece substrate within a chamber, filling the chamber with an inert gas, and heating and pressurizing the inert gas so that thewear resistant surface is formed at the cutting edge portion having diffusion bonding between the coating material and the work piece substrate.

Ecer requires the use of an organic binder and solvent to temporarily hold the cladding material in place on the tool bit. Once the binder and solvent are burned out, there is will not be a high density coating on the tool bit. Contrary to the claims of the present invention, once the cladding is consolidated under pressure in a bed of grain, there will not be a tenacious diffusion bond between the cladding material and the tool bit.

The formation of the diffusion bond is the integral aspect of the present invention. The diffusion bond overcomes the drawbacks of prior cutting tools, including those treated in accordance with the teachings of Ecer, by providing a wear resistant and edge holding cutting edge that becomes an integral part of the cutting tool substrate. The cutting edge portion is sharpened so that the diffusion bonding between the coating material and the workpiece substrate retains the wear resistant coating material on the cutting edge portion. In accordance with the present invention, the drawbacks of the prior art are overcome because the wear resistant coating is diffusion bonded and thus retained during the sharpening process of the cutting edge portion and during use of the cutting edge portion of the formed metal product (see, specification page 57, line 12 through page 60, line 3 and Figures 2(a) through 2(d)).

Metal cutting tools go far back in history, and throughout history advancements have been made to improve the wear resistance of the cutting edge. However, even with such a long lineage of technological development, there are no references related to cutting tools, such as drill bits and kitchen knifes, that even remotely suggest the method steps of applicant's invention for creating a superior wear resistance cutting edge. Applicant has recognized that forming a diffusion bond between a wear resistant coating will result in a cutting tool, such as a drill bit or kitchen knife, that has a superior cutting edge. To provide a wear resistant surface, and thus increase the service life of a sharpened edge, the AAPA shows that the conventional art either used a mechanically bonded wear resistant coating applied to the tool substrate or a wear resistant cutting tip adhered to the tool substrate. Ecer teaches that a cladding can be formed on a cutting tool by temporarily binding the cladding using an organic binder, then burning off the binder, then consolidating the cladding in a bed of grain. All of these solutions result in a

mechanical bond between the coating and the substrate. All are less than adequate because during use the mechanically bonded coating chips or flakes off and the wear resistant cutting tip breaks off. Applicant's invention is to use a high density coating and HIP treatment to overcome the problems of the conventional cutting tools.

Applicant's invention is to form a high density, wear resistant coating on a tool substrate and create a diffusion bond between the tool substrate and the coating through the HIP process. This invention obtains a cutting tool that is superior to the conventional cutting tools and an important advancement in the art of cutting tools.

No where in any of the AAPA, Ecer, or any other references of record, is there a recognition that the cutting edge of a cutting tool can be improved through the application of a high density coating and a diffusion bond created through the HIP process. Applicant recognized this advantage and invented the method defined by the claims through this recognition. It is not proper to apply Applicant's own invention, the combination of a cutting tool with a diffusion bonded wear resistant cutting edge, in making the obviousness rejection. To do so would be using Applicant's own invention against him.

The AAPA that discuss using a HIP process to form a diffusion bond do not form this bond to create a superior wear resistant coating on the sharpened edge of a cutting tool, such as a drill bit or kitchen knife. Rather, these references use HIP to repair gas turbine engine parts. To further distinguish the claimed invention, the HIP process has been specifically claimed as comprising disposing the coated workpiece substrate within a chamber, filling the chamber with an inert gas, and heating and pressurizing the inert gas so that the wear resistant surface is formed at the cutting edge portion and having a diffusion bonding between the coating material and the workpiece substrate. This language further defines the invention over the newly cited Ecer.

The AAPA that discuss the drawbacks of the conventional cutting tools and Ecer do not recognize that a solution to the drawbacks can be obtained through the HIP process. There is no motivation provided by Ecer to modify the conventional method of producing a conventional cutting tool so that a diffusion bonded hard coating is created at the cutting tool's edge area to overcome the problems that typically cause a conventional cutting tool to loose its sharpened edge.

Ecer teaches away from the HIP process by forming a porous cladding through the burning away of the organic binder and solvent. This porous cladding coating is not a density coating that can be effectively HIP treated. The treatment disclosed by Ecer for consolidating the cladding is to place the coated tool bit into a bed of grain and exposing it to pressure and heat. This method will not result in the diffusion bond between the coating and the substrate. The combination of a cutting tool substrate with a HIP processed diffusion bonded wear resistant coating is the very essence of applicant's own invention. There is no reference that suggests improving a cutting tool using a metalurgical process that is known for repairing gas turbine engine parts. Applicant respectfully submits that the hindsight afforded by the applicant's invention has been used in rejecting the claims based on obviousness and the rejection should be removed.

It is well settled that even if a combination of references teaches every element of a claimed invention, without a motivation to combine, a rejection based on obviousness is improper. (see, *In re Rouffet,* 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998)).

There simply is no recognition or suggestion in the cutting tool related AAPA and Ecer to the creation of a diffusion bond for overcoming the problem of flaking or removal of the wear resistant cutting material – this is the very problem that is solved by the claimed invention. The problem is solved by the inventive use of the high density coating/HIP treatment process. There is no suggestion and no motivation provided in the references for forming a cutting tool using these processes.

The AAPA teaches that it is known to apply a wear resistant coating to a conventional cutting tool to obtain a wear resistant cutting edged. For example, the AAPA discusses that it is known to form a wear resistant coating of Cobalt on a cutting tool substrate through chemical vapor deposition (specification, page 4, line 17 through page 5 line 1). The AAPA relevant to this teaching also discusses that "the bond between the substrate and the coating occurs primarily through mechanical adhesion within a narrow bonding interface. During use, the coating at the cutting surface of the cutting tool is subjected to shearing forces resulting in flaking of the coating off the tool substrate. The failure is likely to occur at the narrow bonding interface" (specification, page 5, lines 1-5).

The specific limitations in the rejected claims are not described in the prior art relied on in the rejection. Applicant's invention, as defined by the claims, solves this failure by providing a method of forming a metal product having an edge area comprising a cutting edge having a wear resistant surface. A high-density coating process is performed to coat the cutting edge portion of the workpiece substrate with a wear resistant coating material. A hot isostatic pressing treatment is performed on the coated workpiece substrate to obtain a metal product having a wear resistant surface comprised of the coating material. The wear resistant surface is formed at the cutting edge portion and has diffusion bonding between the coating material and the workpiece substrate. The cutting edge portion is sharpened so that the diffusion bonding between the coating material and the workpiece substrate retains the wear resistant coating material on the cutting edge portion during the sharpening process of the cutting edge portion and during use of the cutting edge portion of the formed metal product. Applicant respectfully submits that these claim limitations render the claimed subject matter unobvious over the prior art.

In view of the foregoing, favorable consideration and allowance of the claims of the application are most respectfully requested. The Examiner is invited to contact the undersigned by telephone if there are any questions or suggestions regarding the present application.

Respectfully submitted,

June 10, 2005

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MAILING CERTIFICATE

Date of Deposit: June 10, 2005

I hereby certify that this correspondence is being deposited with the United States Postal Service as "First Class Mail" on the date indicated above in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

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